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Mobile S witching Center (MSC) — 107

105

Radio Network Controller (RNC)

119 — Master Timing Unit (MTU) [SFC]

RNC Control Unit

121 — Diversity Handover Unit (DHO) STU [SFC]

115

MUU Function Board

STU | SFC

109 — ET

ET

109 111

111

101 117 101

Base S tation (BS) 115

Base S tation (BS) 115

109 — ET

STU [SFC]

STU [SFC]

ET — 109

Tx/Rx

BS Control

BS Control

Tx/Rx

117 113

113 117

102

102

MS Mobile station

103

Fig. 1(a)

(PRIOR ART)

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DPDCH | Data N_{data} bits

DPCCH | Pilot N_{pilot} bits | TFCI N_{TFCI} bits | FBI N_{FBI} bits | TPC N_{TPC} bits

T_{slot} = 2560 chips, $10*2^k$ bits (k=0..6)

| Slot #0 | Slot #1 | | Slot #i | | Slot #14 |

1 radio frame: T_f = 10 ms

Frame structure for uplink DPDCH/DPCCH

Fig.   1(b)
(PRIOR ART)

DPDCH   DPCCH   DPDCH   DPCCH

| Data1 N_{data1} bits | TPC N_{TPC} bits | TFCI N_{TFCI} bits | Data2 N_{data2} bits | Pilot N_{pilot} bits |

T_{slot} = 2560 chips, $10*2^k$ bits (k=0..7)

| Slot #0 | Slot #1 | | Slot #i | | Slot #14 |

One radio frame, T_f = 10 ms
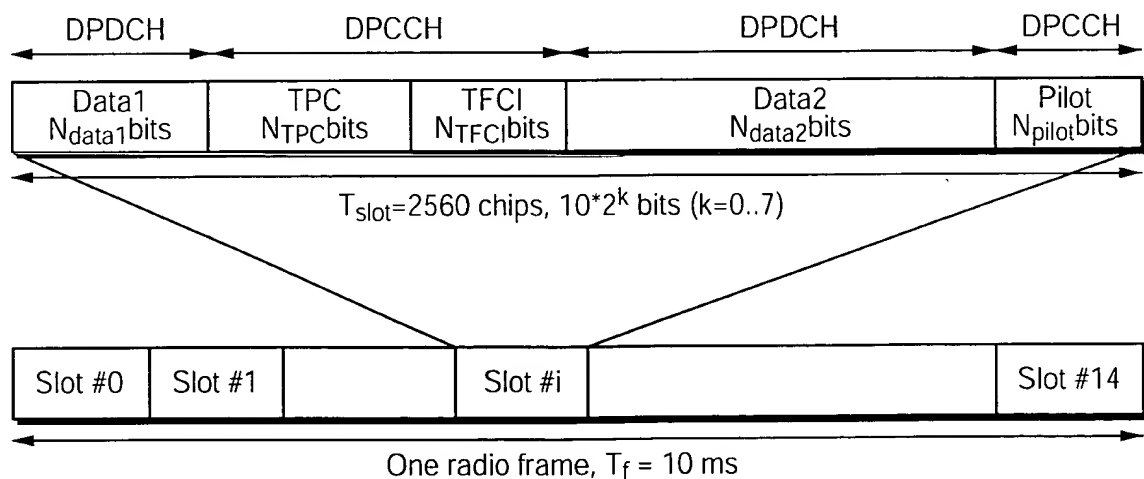
Frame structure for downlink DPCH

Fig.   2
(PRIOR ART)

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One frame
(10 ms)

Transmission gap available for
inter-frequency measurements
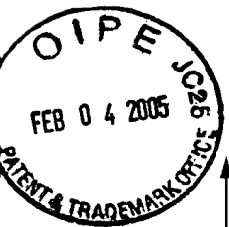
Compressed mode transmission
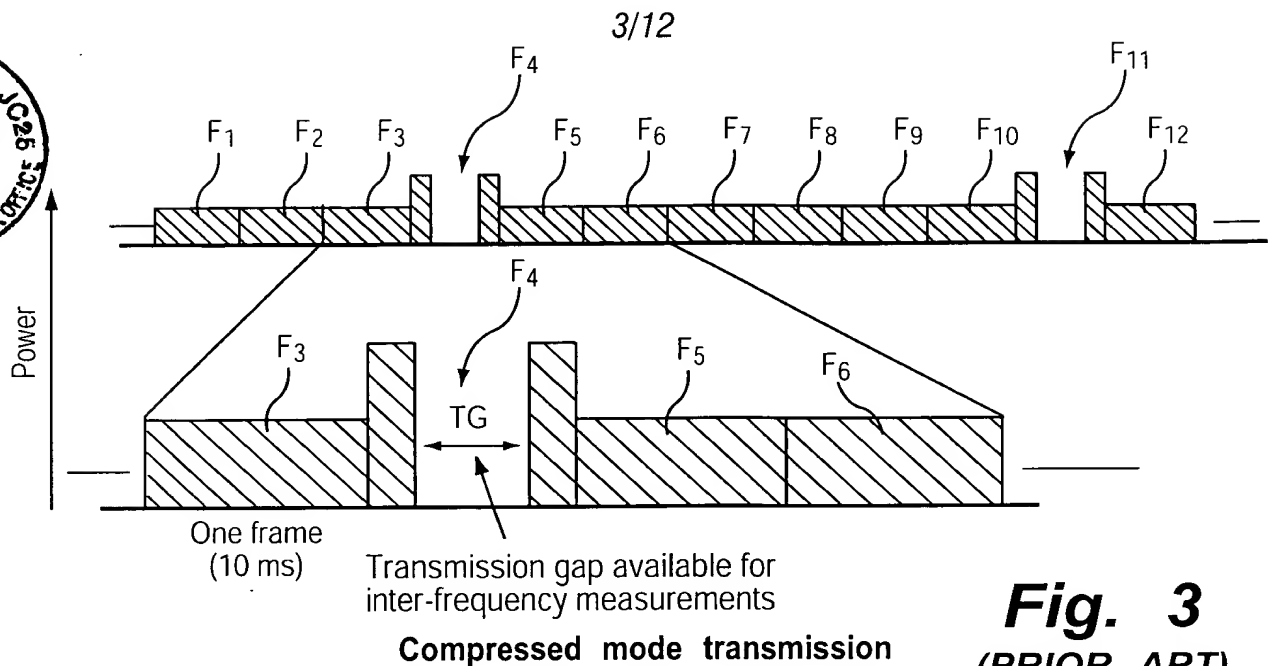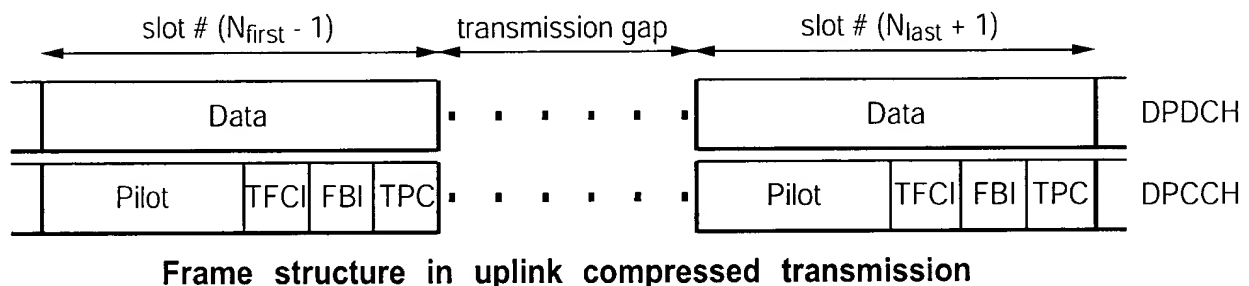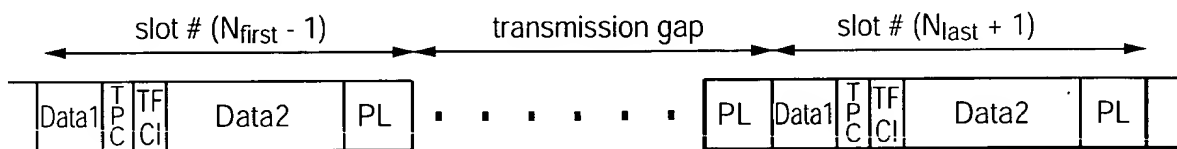
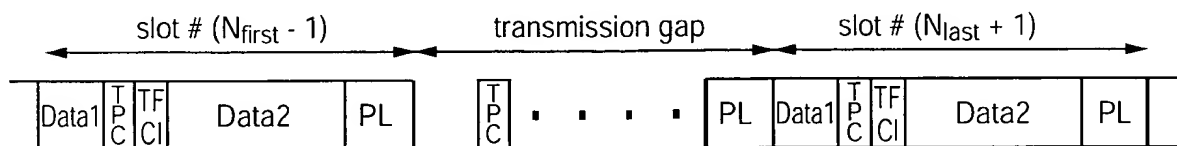# Fig. 3
(PRIOR ART)

Frame structure in uplink compressed transmission

Fig. 4
(PRIOR ART)

(a) F rame structure type A

Fig. 5(a)
(PRIOR ART)

(d) Frame structure type B

Frame structure types in downlink compressed transmission
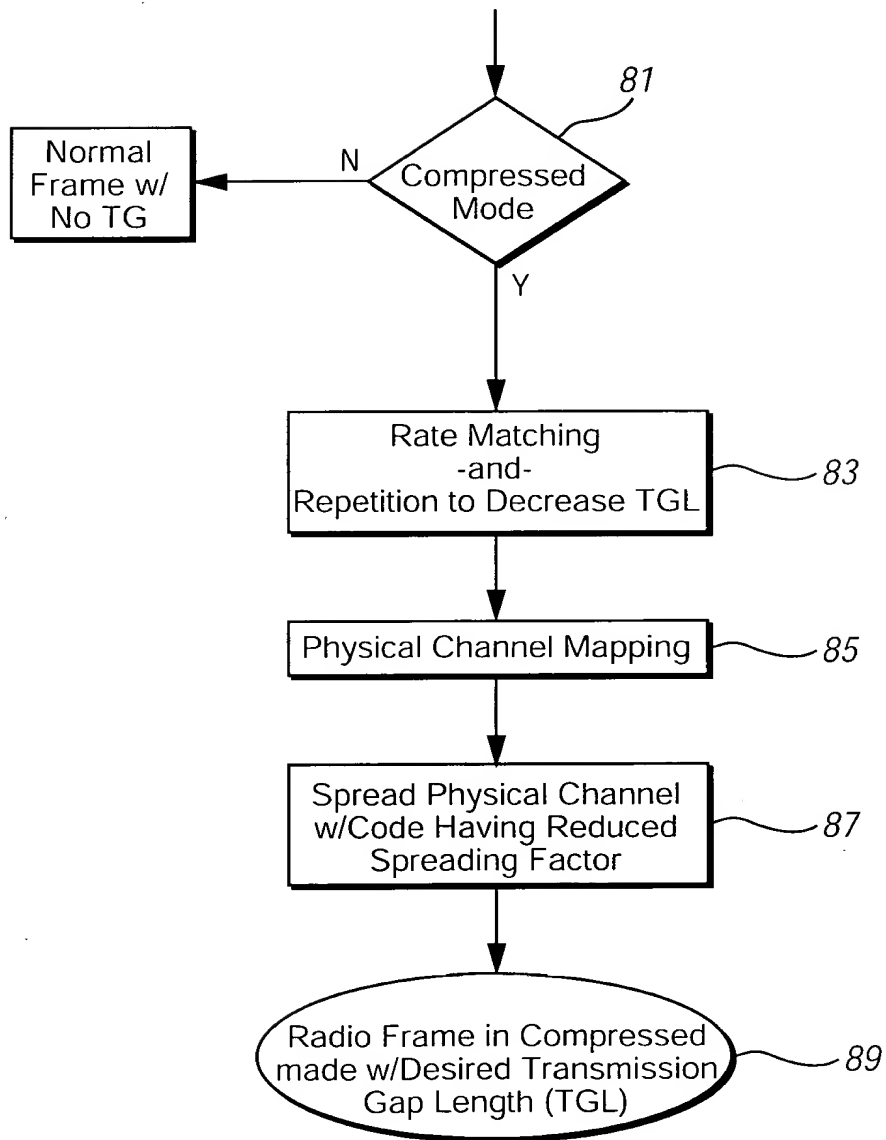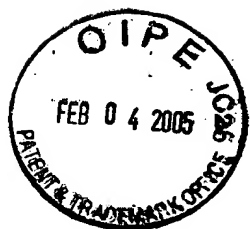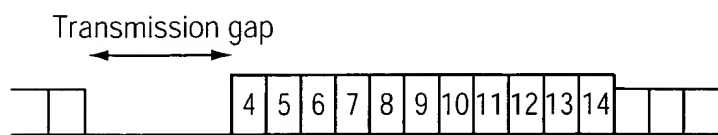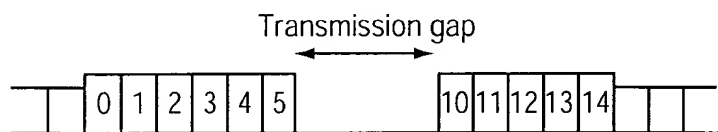
Fig. 5(b) (PRIOR ART)

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```
                              ┌──────────┐
                        N     ╱   81    ╲
  ┌──────────┐   ◄───────────╱Compressed ╲
  │ Normal   │              ╲   Mode     ╱
  │ Frame w/ │               ╲          ╱
  │ No TG    │                  └──────┘
  └──────────┘                    │ Y
                                  ▼
                      ┌────────────────────────┐
                      │    Rate Matching       │
                      │       -and-            │── 83
                      │ Repetition to Decrease TGL │
                      └────────────────────────┘
                                  │
                                  ▼
                      ┌────────────────────────┐
                      │ Physical Channel Mapping │── 85
                      └────────────────────────┘
                                  │
                                  ▼
                      ┌────────────────────────┐
                      │ Spread Physical Channel │
                      │ w/Code Having Reduced   │── 87
                      │   Spreading Factor      │
                      └────────────────────────┘
                                  │
                                  ▼
                      ╱────────────────────────╲
                     │ Radio Frame in Compressed │
                     │ made w/Desired Transmission │── 89
                     │   Gap Length (TGL)        │
                      ╲────────────────────────╱
```

Fig. 6

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Transmission gap

| | | | |4|5|6|7|8|9|10|11|12|13|14| | | |

Fig. 7

Transmission gap

| | |0|1|2|3|4|5| | |10|11|12|13|14| | | |

Fig. 8(a)

Transmission gap

| | |0|1|2|3|4|5|6|7|8|9| | |14| | | |

Fig. 9

Transmission gap

| | |0|1|2|3|4|5|6|7|8|9|10| | | | |

Radio frame

Fig. 10

DPCCH FRAME

		TG							
S4	S5			S10	S11	S12	S13	S14	
								$C_{11\text{-}9}$ =	
$C_{17\text{-}15}$	$C_{14\text{-}12}$			$C_{11\text{-}9}$	$C_{8\text{-}6}$	$C_{5\text{-}3}$	$C_{2\text{-}0}$	$d_{2\text{-}0}$	

Fig. 8(b)

| TFCI | Data1 | TPC | Data2 | PL |

| | |0|1|2|3|4|5| TG |10|11|12|13|14| Radio frame |

| TPC | Data2 | PL | | PL | | TPC | | PL | | TPC | | PL | TFCI | TPC | DATA2 |

Fig. 11

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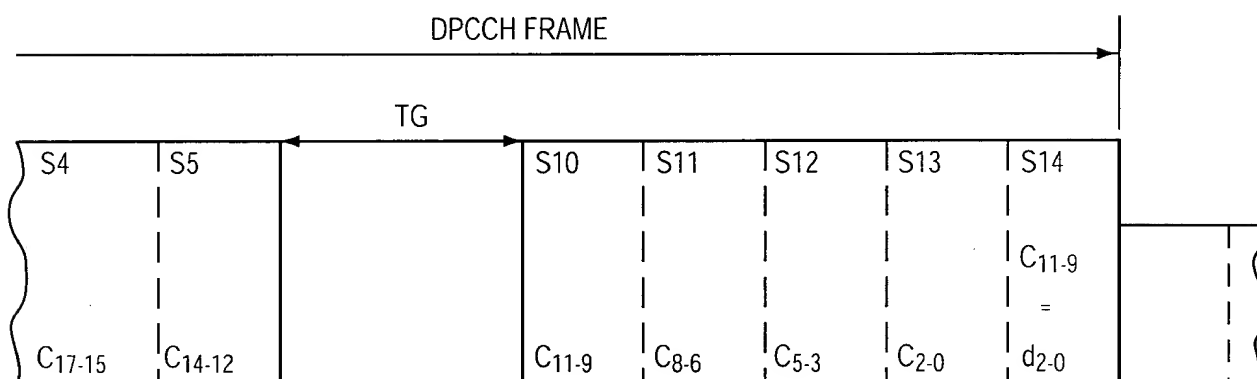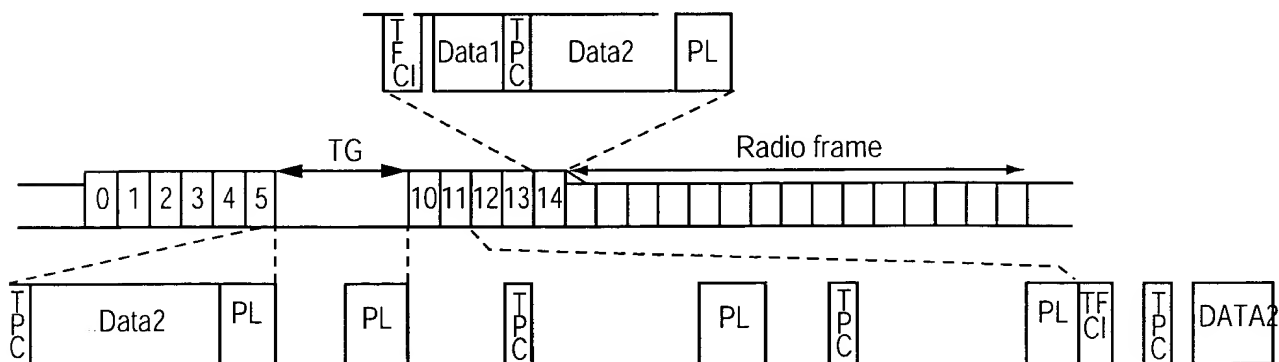SN 09/511,242/Sheet 6 of 12
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Fig. 12

Table 2: DPCCH fields

Slot Format #i	Channel Bit Rate (kbps)	Channel Symbol Rate (ksps)	SF	Bits/ Frame	Bits/ Slot	$N_{pil ot}$	$N_{TP C}$	$N_{TF CI}$	$N_{FB I}$	Transmitted slots per radio frame
0	15	15	256	150	10	6	2	2	-	15
0A	15	15	256	150	10	5	2	3	0	10-14
0B	15	15	256	150	10	4	2	4	0	8-9
1	15	15	256	150	10	8	2	0	0	8-15
2	15	15	256	150	10	5	2	2	1	15
2A	15	15	256	150	10	4	2	3	1	10-14
2B	15	15	256	150	10	3	2	4	1	8-9
3	15	15	256	150	10	7	2	0	1	8-15
4	15	15	256	150	10	6	2	0	2	8-15
5	15	15	256	150	10	5	1	2	2	15
5A	15	15	256	150	10	4	1	3	2	10-14
5B	15	15	256	150	10	3	1	4	2	8-9

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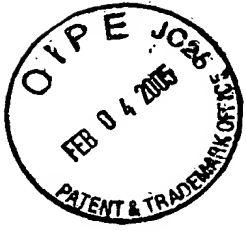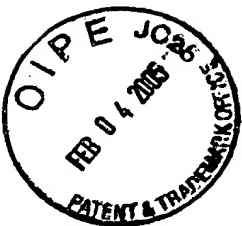Atty. Dkt.: 2380-169

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Fig. 13(a)

Table 3: Parameters for different TGLs in compressed mode

TGL	Type	Adjustable /fixed gap position	Spreading Factor	Idle length[ms]	Transmission time Reduction method	Idle frame Combining
3	A	Adjustable Or Fixed	512 – 4	1.73-1.99	Puncturing Spreading factor reduction by 2 Higher layer scheduling	(S) (D) =(1,2),(2,1)
	B		256- 4	1.60-1.86		
4	A		512 – 4	2.40-2.66		(S) (D) =(1,3),(2,2),(3,1)
	B		256- 4	2.27-2.53		
7	A		512 -4	4.40-4.66		(S) (D)=(1,6),(2,5),(3,4),(4,3),(5,2),(6,1)
	B		256- 4	4.27-4.53		
10	A		512 – 4	6.40-6.66		(D)=(3,7),(4,6),(5,5),(6,4),(7,3)
	B		256- 4	6.27-6.53		
14	A	Fixed	512 – 4	9.07-9.33		(D) =(7,7)
	B		256- 4	8.93-9.19		

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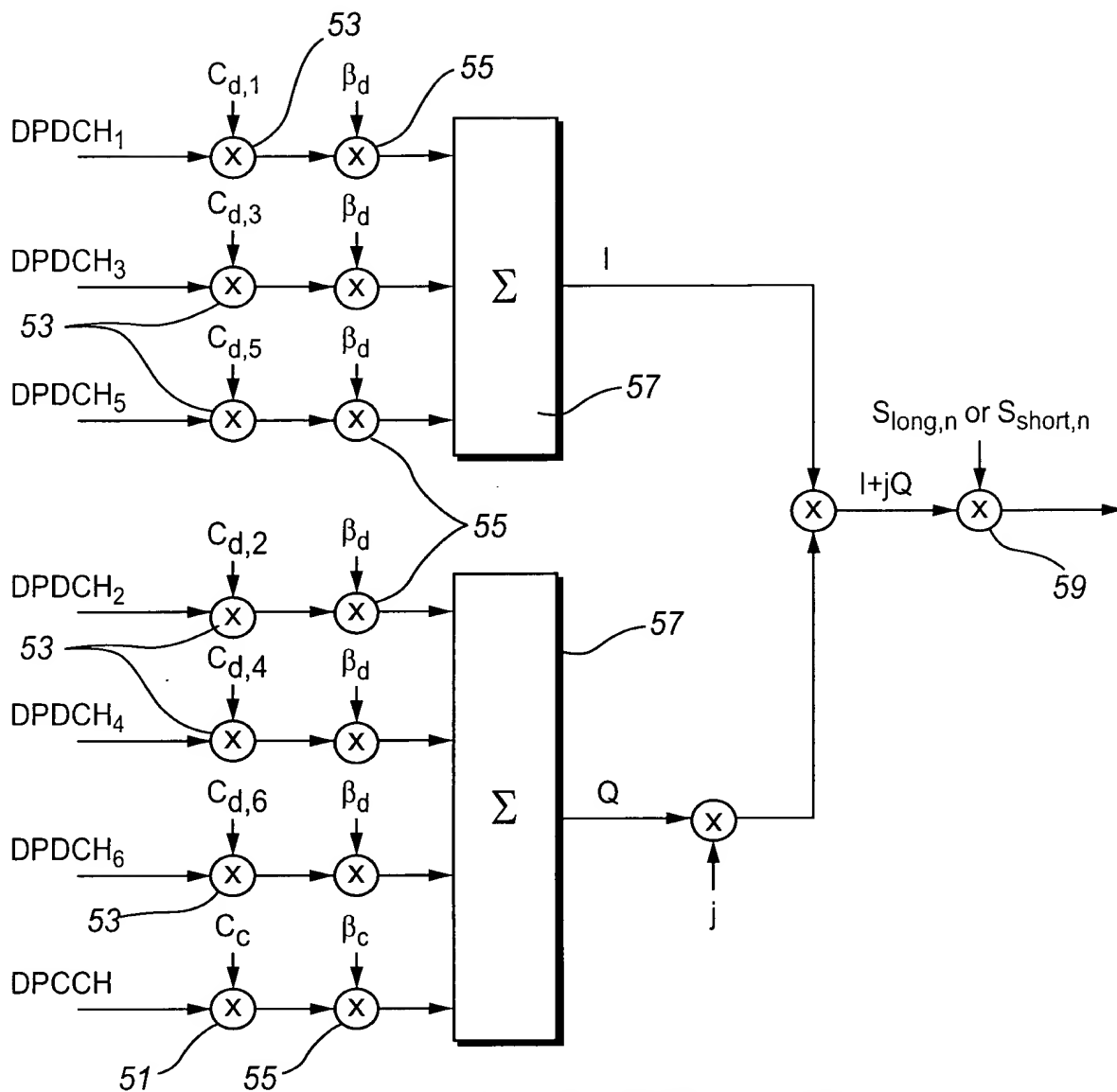Atty. Dkt.: 2380-169

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Fig. 13(b)

Table 3: Parameters for different TGLs in compressed mode

TGL	Type	Adjustable /fixed gap position	Spreading Factor	Idle length[ms]	Transmission time Reduction method	Idle frame Combining
3	A	Adjustable Or Fixed	512 – 4	1.73-1.99	Puncturing Spreading factor reduction by 2 Higher layer scheduling	(S) (D) =(1,2),(2,1)
	B		256- 4	1.60-1.86		
4	A		512 - 4	2.40-2.66		(S) (D) =(1,3),(2,2),(3,1)
	B		256- 4	2.27-2.53		
7	A		512 -4	4.40-4.66		(S) (D)=(1,6),(2,5),(3,4),(4,3),(5,2),(6,1)
	B		256- 4	4.27-4.53		
10	A		512 - 4	6.40-6.66		(D)=(3,7),(4,6),(5,5),(6,4),(7,3)
	B		256- 4	6.27-6.53		
14	A	Fixed	512 - 4	9.07-9.33		(D) =(7,7)
	B		256- 4	8.93-9.19		

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Spreading for uplink DPCCH and DPDCHs

Fig. 14
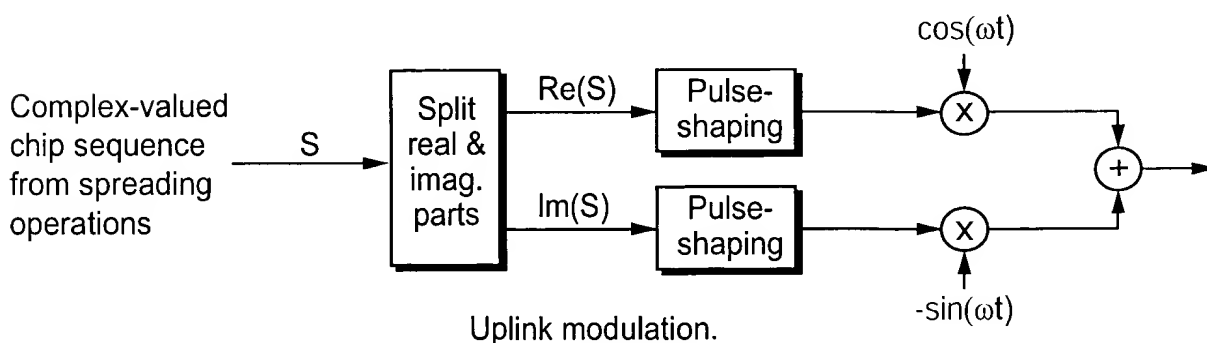
Uplink modulation.

Fig. 15

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$a_{im1}, a_{im2}, a_{im3}, ..., a_{imA_i}$

CRC attachment

$b_{im1}, b_{im2}, b_{im3}, ..., b_{imB_i}$

TrBk concatenation/
Code block segmentation

$o_{ir1}, o_{ir2}, o_{ir3}, ..., o_{irK_i}$

Channel coding

$c_{i1}, c_{i2}, c_{i3}, ..., c_{iE_i}$

Rate matching

Rate matching · · ·

$g_{i1}, g_{i2}, g_{i3}, ..., g_{iG_i}$

1st insertion of DTX
indication

$h_{i1}, h_{i2}, h_{i3}, ..., h_{i(F_iH_i)}$

1st interleaving

$q_{i1}, q_{i2}, q_{i3}, ..., q_{iQ_i}$

Radio frame
segmentation

$f_{i1}, f_{i2}, f_{i3}, ..., f_{iV_i}$ · · ·

TrCH Multiplexing

$s_1, s_2, s_3, ..., s_S$

2nd insertion of DTX
indication

$w_1, w_2, w_3, ..., w_{PU}$

Physical channel
segmentation

$u_{p1}, u_{p2}, u_{p3}, ..., u_{pU}$ · · ·

2nd interleaving · · ·

$v_{p1}, v_{p2}, v_{p3}, ..., v_{pU}$ · · ·

Physical channel mapping · · ·

· · ·
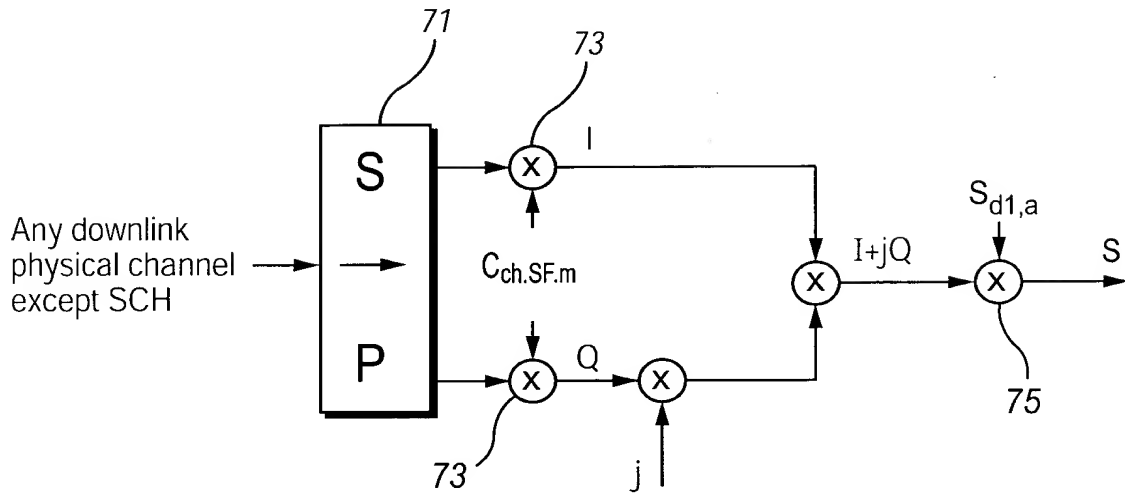
PhCH#1   PhCH#2 · · ·

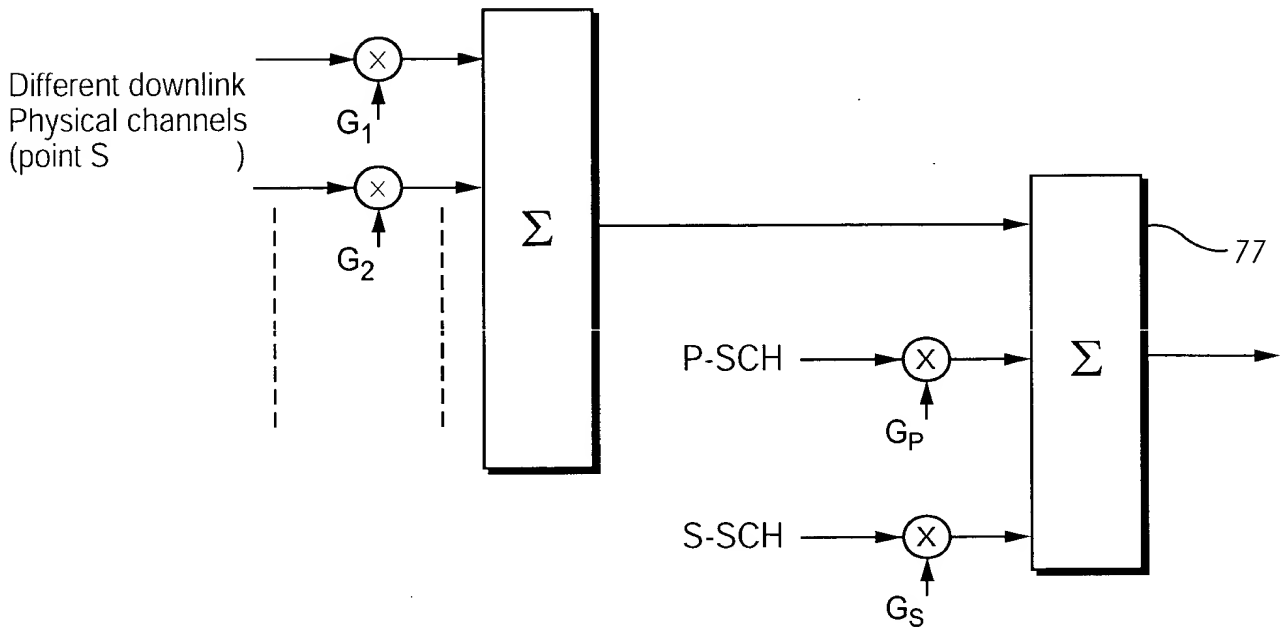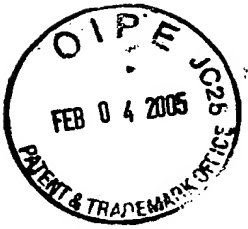Transport channel multiplexing structure for downlink

Fig.   16

Spreading for all downlink physical channels except SCH

Fig. 17
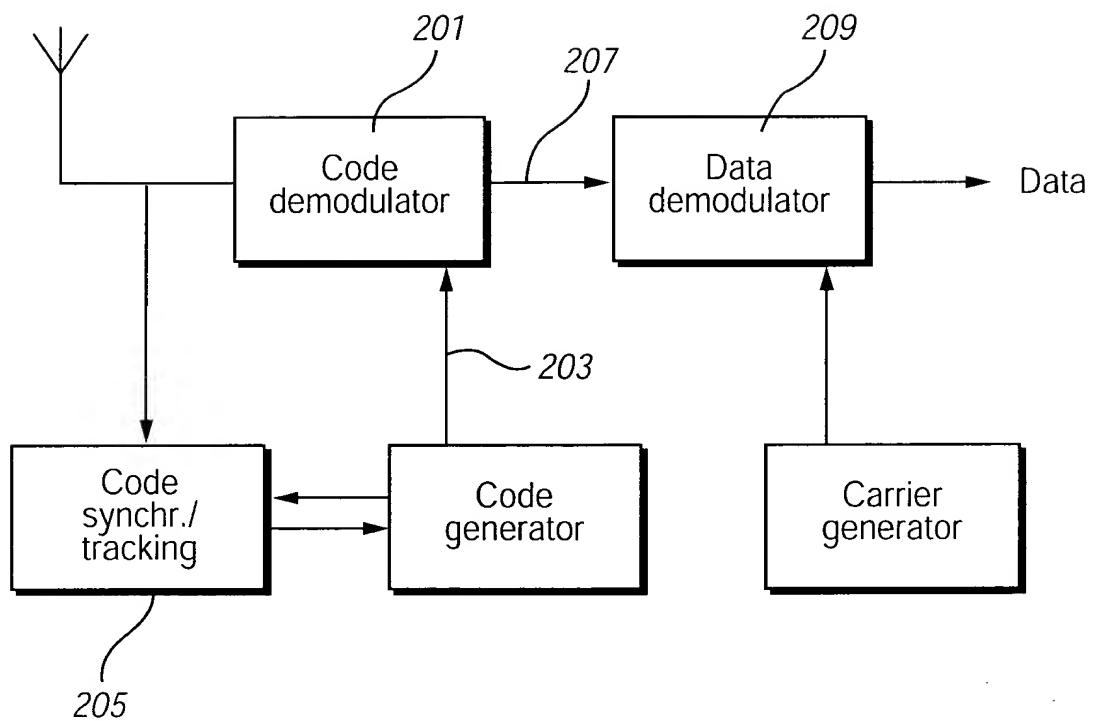

Spreading and modulation for SCH and P-CCPCH

Fig. 18

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Fig. 19